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2015

Research and Innovation

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IMPRESSUM

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Contents...

Murmur 2015 - Editorial

Dear Reader,

As Public Relations Officer for the term 2014-2015, I'm proud to present to you the 2015 edition of Murmur! Murmur is a yearly magazine published by MMSA with informative information and interviews on different aspects of medicine according to the theme chosen. Murmur is an esteemed publication recognised by the local medical community and by IFMSA which is the International Federation of Medical Students' Associations.

This year, the theme chosen was "Research and Innovation". Using this theme, we wanted to promote research especially in the field of medicine. Thanks to research, Medicine has changed drastically over the last few years, coming up with new ways of treatment which were thought impossible before. In Murmur 2015, we wanted to feature research that is currently taking place hoping that it can help encourage more people especially medical students to take up research as this can help change the way doctors treat patients and even how patients can treat themselves. Last but not least, we also wanted to raise awareness on how technology in Medicine is improving. Thanks to innovations in medical technology, patients can now be more conscious about their health through their smart devices, such as, their smartphones, tablets and wearables.

I hope you'll enjoy reading this year's edition of Murmur! I also wish to take the opportunity to encourage you to take interest in research simply not because this can improve your CV or help you with your studies, but it can help change the way we treat and also help other researchers involved in similar projects! Finally, I would like to invite you to read previous versions of Murmur by going on MMSA's ISSUU page as described on the back cover.

Best Regards,

Leonard Callus
MMSA Public Relation's Officer 2014-2015

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A Word with Researchers

David Borg

I got the chance to meet with Dr. Sarah Cuschieri, a lecturer and researcher at UoM, who has a special interest in diabetes. She is currently conducting a research of its prevalence (along with other things) in the Maltese islands.

1. Tell us about your current research.

My research will determine the prevalence (frequency) of Diabetes Mellitus Type II, impaired glucose tolerance, obesity, hypertension in Malta & Gozo along with an understand our current lifestyle. A representative sample of 4000 randomised people was provided.

The research aims also to find the risk factors contributing to these common diseases and identify the interrelations between them. The goal is to formulate a risk score for diabetes and its associated diseases specific for the Maltese islands.

Apart from this, I would also be studying the genetics of these people from a diabetes and obesity point of view.

2. Could you tell us briefly about any previous research you were involved in?

I started doing research as a medical student. My first research task was an audit at A&E department to determine the time it takes a patient from first contact at reception till he/she is discharged or admitted from A&E. The aim was to find bottlenecks within the system.

My research continued as a foundation doctor where I did several audits (all of which are now published) in the primary health care, in the Cardiology department, in Gastroenterology department as well as in the Obstetrics and Gynaecology department.

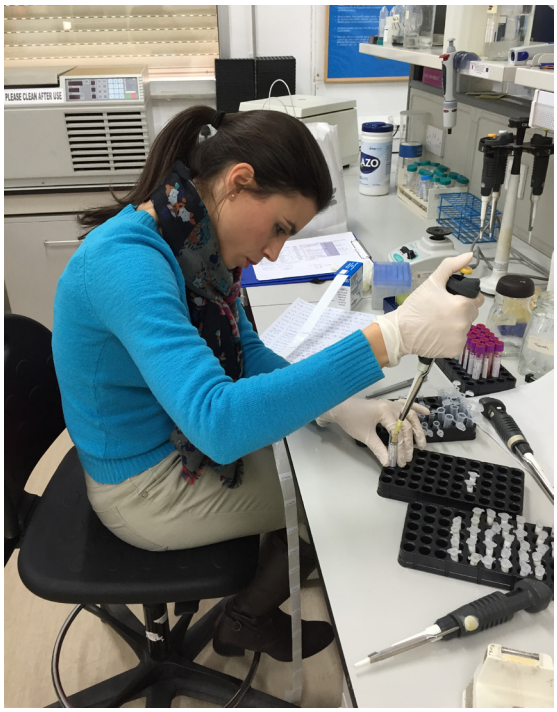
My latest finished research (before the current one), focused on a screening protocol for gestational diabetes among a high-risk population without the need to perform an OGTT on every high-risk pregnant woman (This is no awaiting publication).

3. Are there any research opportunities you wish to be part of in future?

Yes I would like to continue my research in public health and medical education with special attention to diabetes, obesity and lifestyle. I believe there are many things that need to be improved even within our medical community apart from the general Maltese community.

4. What motivated/inspired you to embark on this research?

I always had a passion for diabetes and being a doctor I wanted to base my research on something other people can benefit from. So I took on this research with the aim to help my country overcome its commonest diseases and try to prevent them from occurring.



5. Who will benefit most from this research? How will society in general benefit from this research?

The adult Maltese population will benefit from my research since they will be given information and a tool to self-diagnose risk factors for the most common diseases within the community (mainly diabetes, obesity, hypertension) as well as guidelines on how to proceed with their symptoms. Medical authorities will also benefit as the research will be the backbone to organise policies and strategies.

6. How important is this research?

My research is of utmost importance to the public health world including the government since it will give an evidence based backbone for policies and preventive measures for the Maltese islands.

7. What audiences are you addressing?

The research will be of benefit to the medical health care professions, the public health officials, and policy makers as well as to the general public.

8. Does your research address culture, family habits, ethnicity and income?

The research addresses health well being, prevention and economical burden.

9. When did this research commence and when is it expected to be complete?

Officially it was launched on the 31st of October 2014 with the research data collection starting on the 7th of November 2014.

The first stage of the research is expected to finish by end of 2016.

10. A research of this magnitude is certainly not a one-man job. Did you find any help, and how willing were these people to help out?

Most tasks are performed by myself singlehandedly (including logistics, transport of material and bloods to and from location and hospital/University of Malta, co-ordination etc.) but I have found great support from my parents, my supervisor Dr. Julian Mamo and the heads of department of Anatomy and Physiology. But the biggest help I get is from medical students who came to help me out during the fieldwork. It is a pleasure to work with our future doctors.

11. What resources had to be used to complete this research?

The initial steps taken before the research started was the setting up of a steering committee to formulate a research protocol. This consists of the researcher (myself) and experts from different fields including epidemiology, diabetologist, medical statistician, pathologist and geneticist.

Various permissions were required including ethics, data protection, permission to use peripheral clinics (bereġ) and health centres from Primary Care and Ministry for Energy and Health.

A marketing campaign was set up by the researcher to find various sponsors to support this research financially. Thanks to the University of Malta through the Research and Innovation Trust and Faculty of Medicine and Surgery as well as Alf Mizzi Foundation and Atlas who are the research's main sponsors, the budget was reached. Other contributors were also provided from various pharmaceutical companies and small businesses.

This project also requires human resources where medical students give the majority of help. A PR team was set up along with a webmaster to help in the promotion of this research. Further details could be found on: www.sahhtek.com or Facebook page: SAHHTEK.

12. At present, the percentage of diabetics in the Maltese isles is 10% of the Maltese and Gozitan population. Why do you feel the need for this statistic to be changed?

There hasn't been any research on the prevalence of diabetes since 1981 so the 10% percentage is just extrapolation from the last study. Although clinicians know that there is a high rate of diabetic patients in Malta, there is no evidence-based information on this. It is one of the aims of this research to provide up-to-date diabetes prevalence. This research will go beyond this and provide the prevalence also of obesity, metabolic syndrome and hypertension as well as risk factors and co-relations between these.

In order to be able to formulate strategies and policies for the nation, one needs to have a firm ground and knowledge of the current situation. This research will be able to provide clear and scientific bases for these.

In order to be able to formulate strategies and policies for the nation, one needs to have a firm ground and knowledge of the current situation. This research will be able to provide clear and scientific bases for these.

13. If you were to start again, are there any changes you would make?

I do not think I would change anything, although this research has taken over my life, I am happy with it since I think it is going to make a difference and help my country.

14. In what journals do you expect to publish your research?

Both local journals (Malta Medical Journal, Xjenza) and international journals (European Journal of Public Health, Diabetes Care etc).

15. Can you predict the outcome of this research? (Say you may want to make a predict of the new percentage of diabetics in Malta and Gozo).

From the data collected till now it appears that there is a chunk of the Maltese who are diabetic and had no idea that they were diabetic before the "Free Health Check up" that was being offered. There are also a good number of participants with hypertension and who are obese. I predict that the research will uncover factors that we did not know about or else we suspected but did not have evidence based scientific research.

What's the Big Deal About Research?

Maria Grazia Grech

For a lot of medical students, research means either the physiology and/or anatomy projects in the second year or the research assignments we do in third year. Sometimes we also hear bombastic sounding terms like attachments, audits, publications and posters thrown in the mix. But why should this matter to a medical student? Should we get involved and what's in it for us?

It should matter. A lot. Today's ease of access to information has lead to an explosion of new discoveries and knowledge. In our war to end disease and suffering and improve the lives of others, this is a very precious weapon. However, as the cliche goes, with great power comes great responsibility. Our responsibility is to know how to appraise and apply that knowledge wisely and objectively.

This is actually quite difficult as there are so many sources of information. From the time we are medical students, we need to develop early on the tools necessary to tell whether a discovery is as groundbreaking as it is being portrayed, or whether there are any flaws hindering it. We need to be able to recognise when a medical representative is underplaying the potential disadvantages of the drug he's trying to get you to prescribe it to your patients for example.

While we do get some lectures in this, its a great idea to be involved hands-on. Research is a broad term, which can mean many things ranging from working in a laboratory with cell cultures and microscope slides to talking to patients to check their level of awareness about a health issue. I have done both and it has been an incredibly enriching experience. I grew a lot from them and it cultivated in me a huge sense of respect towards people who dedicate their lives to this.

What would you expect to gain from doing research? First off, you get to know what happens behind the scenes, how much stamina, patience, tenacity and self-discipline is needed. It will help you realise how long it takes for an idea to go from being tested to actually making a tangible difference in patient's life. For example a drug can easily take 15 years to start being marketed. Personally, research helped my problem solving skills, and it helped me learn how to think creatively. Despite the fact that sometimes things take a long time to work, there is always the thrill of finding something new and being the driving force behind it. Another reason is that more and more emphasis is being put on extra curricular activities when it comes to having a good CV and having done something in this area will definitely help.

To conclude...how can you get involved?

• Ask researchers at university whether they allow students to observe or maybe even allow hands-on experiences for students.

• Keep your eyes peeled for national and international opportunities which may arise from time to time example electives and courses abroad. MMSA is a good source but you can also look elsewhere.

• Attend conferences, seminars, symposia to keep yourself informed.

• Share your research at these events via a presentation or a poster (a very short presentation).

Research : What is it Good For?

Al-Harith Al-Shaqsi

Many students do not quite understand the importance behind doing research, especially if done to reaffirm existing studies. This brief article will shed light on the importance of research and why students should not miss opportunities that aim to develop and expand their knowledge.

Students spend most of their time studying and learning. Unfortunately, the vast majority do not indulge in any sort of practical or even theoretical learning, possibly due to lack of resources or, even worst, lack of interest. One should know that by restricting yourself to one way of learning method, you are threatening to lose what you have studied. Think of it as your computer asking you constantly to back-it-up. It is only rational since it prevents information loss. You can backup any information in your long-term memory using different methods; the most effective ones being research and experiment.

When doing research or an experiment, questions are asked, matters are investigated, issues are solved, answers are found and further questions arise. This whole ongoing process enables the mind to create patterns of knowledge that can be connected and linked to each other which can then create the quasi-big-picture. The fun part is that this picture is ever expanding and different pieces are added to the puzzle every time you research. Upon refraining from doing research, you might convince your self as if you had completed the puzzle or as if you can see the whole picture, when if fact it is just like jigsaw puzzle without a picture. Knowledge is ever growing and expanding and unless you try and harness it passionately, effectively and consistently, you will miss the train and would be left in the station of ignorance.

One would ask: why should I do research while I am still in my first or second year of studies? Why I should not wait till I get my degree and then research?

> Well, the early bird catches the worm. Begin in the front raw gives you an advantage to pioneer in any field you desire. It is a matter of how you habituate your self and mind. This is accomplished by being familiarized with practicing research from an early age. This enables you to take initiative and be proficient while doing it. You will be better at finding information, gathering them, processing them and presenting them. One who is not accustomed to research and lack experience would find it difficult to perform any qualities and often fail to peruse any further research. If not convinced yet, ask your self: why many people do research?

Now, the next question should be: where can I find a research opportunity where everyone is struggling to get one and it seems like everything is being researched upon?

> Research dose not concern only the big issues, like climate change and heart diseases, rather, it expands to encompass a wide variety of subjects, starting from the smallest unit of life, the cell, reaching the enormous cosmos.

There are many associations in the university campus, including Malta Medical Student Association (MMSA), that offer yearly clerkships/exchanges for research or work all over the word. I was thrilled that I was awarded an exchange opportunity to Turkey this summer. As a medical student, it is very encouraging to have such a strong association at your side, helping you throughout the years and searching for great opportunities for its members to benefit from.

Thanks MMSA.

MM2016 : How We Won

Dear members!

The March Meeting 2016 General Assembly has dominated MMSA's newsfeed during the past months. Undoubtedly, it will remain enshrined in MMSA's institutional memory for decades to come.

For those who are unaware of the significance of the March Meeting 2016, it would do well to go back to MMSA's history and our involvement within the IFMSA. The International Federation of Medical Students' Associations was founded in 1951. The MMSA was also founded in the same year, completely independent from this budding International Federation. A few years down the line, the MMSA joined the IFMSA as one of its first members. At the time, the IFMSA was confined to the European region, from where it had emerged.

Just a few years after obtaining full membership within the IFMSA, the MMSA had already demonstrated its fervour to work within this Federation. So much so that, in 1957, one of the members of the MMSA, Maurizio Costanzo, was Secretary General for this ever-expanding Federation.

Throughout the years, the IFMSA kept on growing and involving more and more countries. Today it boasts a membership of more than 1.2 million medical students from every corner of the globe, with a significant representation in each and every continent of the world. Nowadays, the IFMSA organises two annual meetings, termed "General Assemblies", one in March and another in August. These meetings serve as the highest governing bodies of the Federation, surpassing the IFMSA Executive in the decision-making processes of the entire Federation.

Despite our small size, with the MMSA being one of the smallest NMOs, we have been tremendously active as IFMSA members. We have organised numerous IFMSA meetings, including the Exchanges Officer Meeting in Valletta, which commemorated IFMSA's 50th birthday, and which also coincided with MMSA's Golden Anniversary. We also hosted a March Meeting in San Pawl il-Baħar, previously in 2001, which saw the involvement of around 300 delegates.

All of these events brought international acclaim to our country and our association; but these do not compare to the upcoming March Meeting, which is estimated to attract more than a thousand delegates to our shores.

I am honoured to have earned the trust of the Board of Directors, the Organising Committee and many MMSA members, who approved the submission of our bid through an Extraordinary General Meeting back in late November. Our work to win the bid to host this March Meeting has followed a long and arduous path, culminating in one week of relentless campaigning in March Meeting 2015 in Turkey, where we competed with Montenegro.

the Bid and What's Next

Gabriel J. Ellul

I owe this pivotal success to all those who trusted my judgement, that of my Board of Directors and my Organising Committee. We would not have made it if we had not worked as one single team: we had a unified spirit which was well evident during the hectic week we spent in Turkey.

I now ask all members to involve themselves in this one-time event. We will be needing all the help we can get to make this a success! Make use of this excellent opportunity to make new friends from abroad, to learn about the experiences of other medical students, along with the challenges they are facing in their country.

There's so much more to being a doctor than studying medicine: you need to learn how to lead, how to communicate, how to empathise. Use this event to gather these essential skills, which will surely serve you a lifetime.

Thank you for all the memories you have given me in the past year.

Best regards and well wishes,

Gabriel Joshua Ellul
MMSA President '14 - '15

Cancer Biomarkers

Erika Babatunde

The early detection and treatment of cancer decreases the amount of suffering to patients and the likelihood of death. Biomarkers are an essential part of cancer care which help in the fight against this disease at all clinical stages of care.

Keywords: Tumour marker, Cancer, Biomarker, Oncology

What is a Biomarker?

According to the National Cancer Institute (USA), cancer biomarkers are defined as "a biological molecule found in blood, other bodily fluids or tissue, as a sign of normal or abnormal process, or of a condition or disease". These biomarkers can either be produced by the tumour cells or by cells that are in the surrounding environment in response to the presence of cancerous cells. Nevertheless, biomarkers are found in a healthy person; however, levels are elevated in cancerous conditions.

Biomarkers come in different forms: while the majority are proteins (secreted proteins, cell surface receptors and enzymes), they can also be in the form of mRNA and DNA. In fact, changes in the patterns of gene expression or the presence of certain forms of mutant genes can be indicative of the presence, or likely development, of cancer.

Clinical Uses of Biomarkers

Cancer biomarkers can be used in a variety of ways during cancer care. Before diagnosis/ treatment, they can be used to detect the presence of cancerous cells or can be used as a screening tool.

A common biomarker tool for screening prostate cancer is analysing the presence of prostate specific antigen (PSA). Nevertheless, elevated levels of PSA are seen in a number of other disease states, which can lead to over treatment and unnecessary biopsies. Unfortunately, this is one of the limitations of cancer biomarkers.

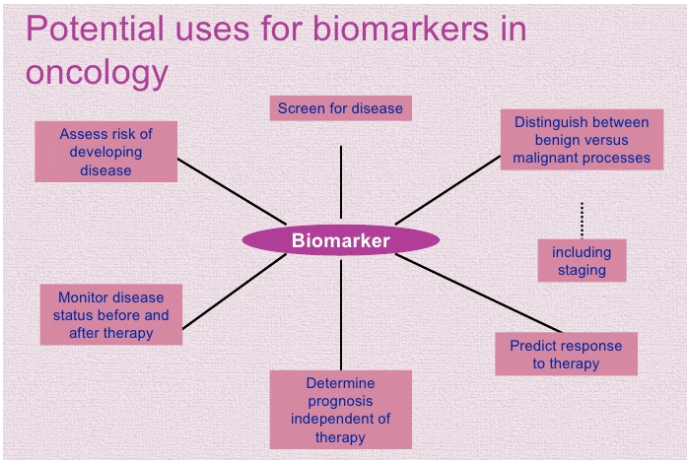
The calculation of the relative risk of developing cancer is another use of biomarkers, so preventative measures and management of risks can occur. In a population with a strong family history of breast/ovarian cancer, genetic testing uses the mutant BRCA1 gene as a biomarker because its increase represents an increased risk of developing these cancers.

Using biomarkers as a diagnostic tool for patients who are being investigated or diagnosed with cancer can be important for cancer staging and determining the possibility of malignancy. Prognostic biomarkers give an indication of the possible course of the cancer if therapeutic measures are not implemented and can be used to predict the probability outcome of the disease.

Lastly, biomarkers can be used to analyse the pharmacokinetics of treatments, to elucidate the likelihood of adverse reactions, possible side effects, and dosage of therapy or determining the most effective course of therapy.

During the treatment of cancer, biomarkers can be used to monitor the success of therapy. Systematic samples and tests performed throughout treatment can show whether the cancer is responding or if alternative measures need to be taken.

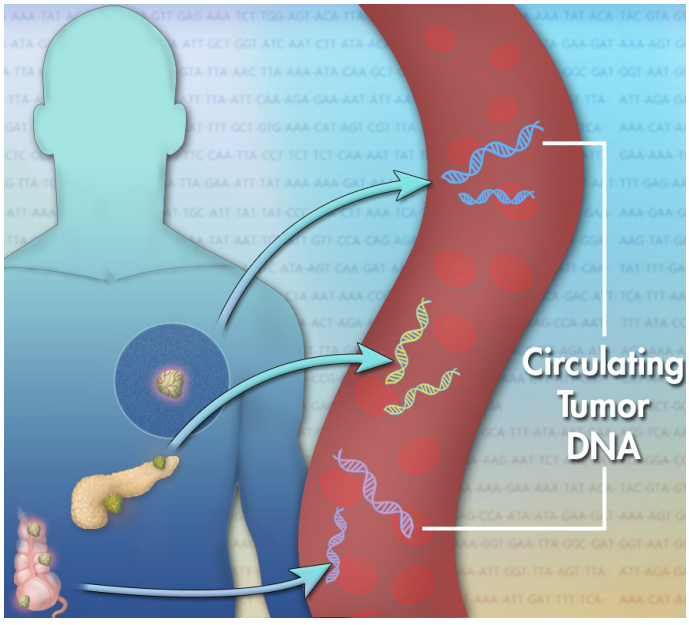
Lastly, post-treatment biomarkers can be used to check for re-occurrence of cancer; this is particularly important if there are familial links to cancer development.



The Future of Biomarkers

Currently, biomarkers offer a myriad of uses in cancer care; nevertheless, it is a developing field with continuous focused research into the discovery and development of new biomarkers, specifically those that can identify the presence of the disease in a non-invasive way.

Advances in sequencing technologies may be solutions to this. After scientists discovered that dying cancer cells release small pieces of DNA into the circulation called cell-free circulating tumour DNA (ctDNA), they investigated the possibility that ctDNA could be used as a potential biomarker to detect the presence of tumours, determine prognosis, monitor progress and response to treatment.



This new study described in the issue of Science Translational Medicine (February 19, 2014) demonstrated that ctDNA can be used in many types of cancer at its various stages. Though still in its infancy, more studies have to be carried out before clinical validation can be reached. Nevertheless, it shows huge promise for developing a more patient-friendly way of diagnosing, monitoring and treating cancer.

Stem Cell Research and Therapy

Michela Galea

In the last few years, stem cell therapy has garnered widespread interest. This article discusses the latest results obtained from recently conducted stem cell research clinical trials so as to exploit the potential of stem cell therapy in being established as a future key treatment.

Keywords: Stem cells, Diabetes, Parkinson's Disease

Stem Cell Research and Therapy

Stem cells are unspecialised cells that are capable of self-renewal and have the potential of developing into various types of cells. They can be classified into three groups: embryonic, adult and induced pluripotent stem cells (iPSCs).

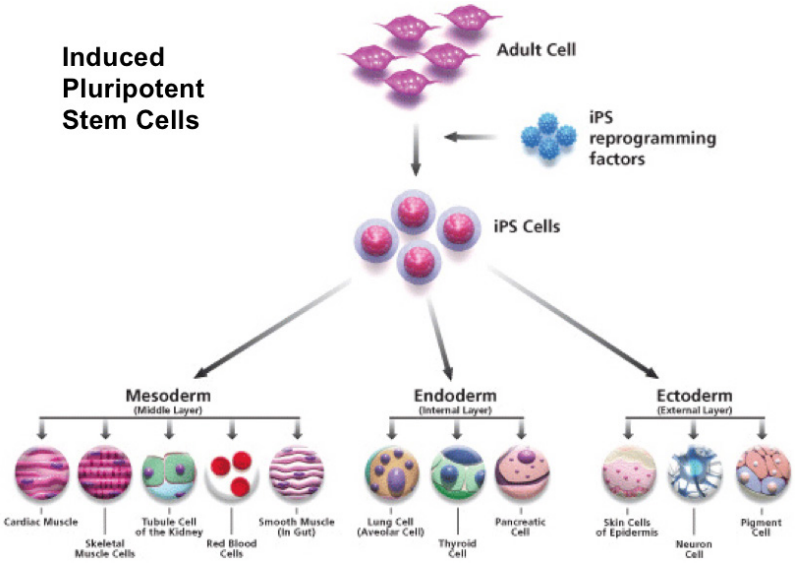
Embryonic stem cells are derived from a blastocyst (a pre-implantation stage embryo) that has developed from an egg, which would have previously been donated for research purposes and undergone in vitro fertilisation. Since it involves the destruction of the embryo, the use of embryonic stem cells in the research field has resulted in a lot of ethical issues. On the other hand, adult stem cells are undifferentiated cells that are found in adult tissues. These play an important role throughout an individual's life because they undergo division in order to replenish dying cells and regenerate damaged ones. In the past, only embryonic and adult stem cells were identified but in 2006 Yamanaka et al., discovered that specialised adult cells could be genetically reprogrammed and converted into stem cells. These started being referred to as induced pluripotent stem cells. Such a medical breakthrough is considered to be a better alternative to the use of embryonic stem cells.

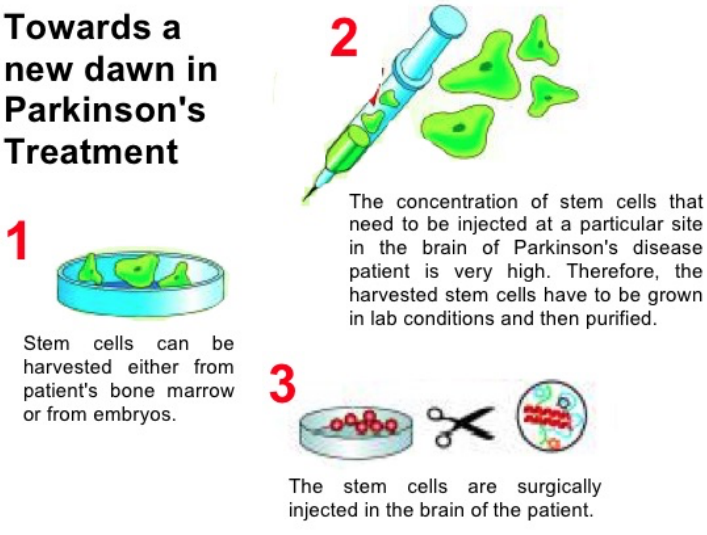
Widespread interest in the use of stem cells in the treatment field has increased during the last few years. In fact, several clinical trials are underway in order to exploit the full potential of stem cells in preventing or curing certain diseases such as Parkinson's disease, Alzheimer's disease and Muscular Dystrophy amongst others. The optimal results that have already been obtained show that stem cell therapy might indeed be established as one of the future's key therapies. Patients undergoing these clinical trials have reported a greater improvement/prognosis than with other presently FDA approved therapies.

Studies conducted at the University of British Columbia have recently shown that human embryonic stem cells could be used in the treatment of type 2 Diabetes Mellitus. In the course of 24 weeks, the obese, diabetic mice, which were treated with a combination of transplanted, stem cell-derived pancreatic cells and an antidiabetic drug, showed an improved glucose tolerance. However, glucose intolerance was still reported in the mice that received either the antidiabetic drug or the transplanted stem cells.

Another promising stem cell therapy involves Parkinson's disease, whereby stem cells were used to regrow the depleted dopamine-producing neurons. Previous investigations had proved to be unsafe due to the increased risk of tumour formation upon stem cell transplantation. However, Brazilian researchers have now addressed this issue by pre-treating mouse embryonic stem cells with mitomycin C, a drug usually used to treat stomach cancer. The mice were then divided into three groups. The first group did not receive any stem cell implants. In the second group, transplantation of stem cells, which were untreated with mitomycin C was carried out whereas the mice in the third group were implanted with mitomycin C, treated stem cells. The symptoms of Parkinson's disease were reduced in both the second and third groups. Yet, only the mice that were implanted with the treated stem cells survived after 12 weeks, since the mice in the second group developed intracerebral tumours.

Stem cell therapy has so far yielded optimal results. Despite this, more intensive research needs to be conducted so that the potential of stem cells is fully exploited. Moreover, in the future, they might provide a means of treating those diseases that are still considered to be incurable.

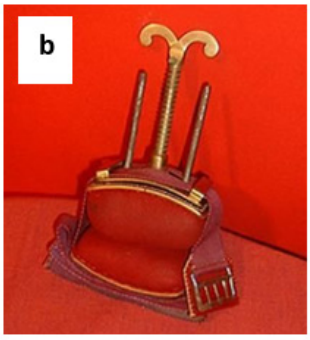


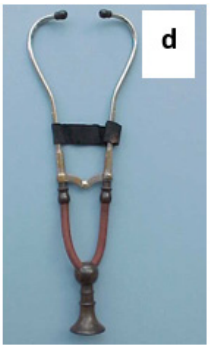


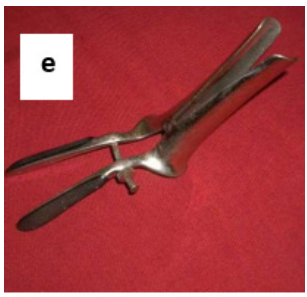
Old is

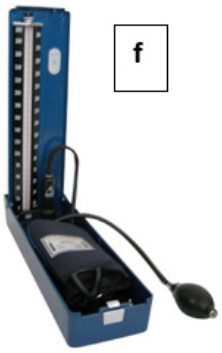
It has been commonly said that 'old is gold', but is it in the field of Medicine? Can you match up the old instruments to the new ones?

Old Instruments:









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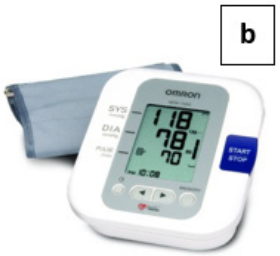

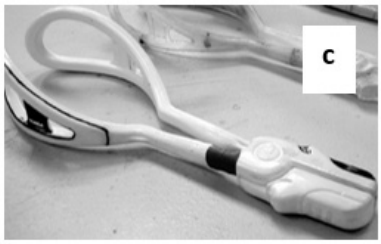

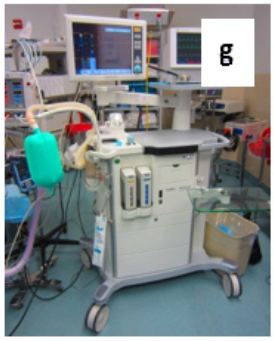

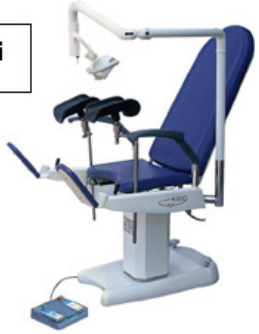

GOLD

by Shafia Khanum

Definitions

(relating to lettering of the old instruments):

a) Anaesthetic Apparatus = used by anaesthetists or nurses to administer anaesthetic

b) Tourniquet = a constricting device used to control blood flow to an area for a particular time period

c) Operating/Examination table = the table where gynaecological exams or operations are done

d) Stethoscope = an acoustic device used to auscultate or hear internal sounds within the human body

e) Speculum = a medical tool for investigating body orifices and doing tests like the cervical smear

f) Sphygmomanometer = a medical device used to measure blood pressure

g) Obstetric forceps = resemble a pair of tongs and assist delivery instead of the vacuum method

h) Anaesthetic inhaler = the mask through which anaesthetic is inhaled into to the body

i) Otoscope = a medical device which is used to look into the ears

j) Syringe = a simple pump and plunger used to inject fluid into the body

Answers:

a+g , b+a , c+i , d+f , e+e , f+b , g+c , h+d , i+h , j+j

PARP Inhibitors in Cancer Therapy: Magic Bullets But Moving Targets

Ritianne Buhagiar

Inhibition of poly(ADP-ribose) polymerases (PARPs) is a potential therapeutic strategy in malignancies characterized by particular DNA repair defects, including those arising in carriers of BRCA1 or BRCA2 mutations. This article is an endeavour providing a comprehensive appraisal of the manifold biology of PARPi and their inclusion in the arsenal of anti-cancer drugs.

Keywords: poly(ADP-ribose) polymerase, PARP-inhibitors, base excision repair, synthetic lethality

The poly(ADP-ribose) polymerases (PARPs) make up a large group of enzymes that carry out diverse functions, some of which are essential in the base-excision repair (BER) pathway. The pharmacological inhibitors of PARP (PARPi) actualized the biological theory of synthetic lethality in clinical trials, producing a classical example of translational medicine.

BER/HRR Nexus for Synthetic Lethality of PARPi in BRCA-Mutant Cancers

In BER, PARP-1 abolishes abasic sites and unrepaired SSBs generated constantly in the mammalian genome by various oxidants. During BER, the binding of PARP-1 to SSB stimulates its catalytic activity of forming PAR polymers from its substrate NAD+. The PAR and PARP-1 then interact and recruit the key BER-scaffold protein XRCC1, whereas PAR-modified PARP-1 loses its affinity to bind to SSB and empties the site for BER to continue. This function of PARPs in DNA repair prompted the investigation of PARPi as potential therapeutics for malignancy, a disease in which DNA replication and therefore, replication errors are dominant features, and deficiencies in DNA-repair pathways are frequent. In 2005, it was revealed by two simultaneously published seminal articles (Bryant et al. 2005; Farmer et al. 2005) that BRCA1 or BRCA2 malfunctions resulted in deficient homologous recombination (HR) and markedly sensitized cells to PARP-1 inactivation.

The precise molecular mechanism underlying the selective targeting of HR-deficient cells by PARPi is still unidentified and is a matter of ongoing research. A plausible explanation follows the assumption that when PARPi annihilate the role of PARP-1 in BER, SSB would accumulate and collapse the DNA replication fork to produce lethal double strand breaks (DSB). The healthy cells would thrive by repairing these DSB by HRR, but the BRCA-mutants that lack HRR would die due to unrepaired DSB. PARP1 has a major influence in non-homologous end joining (NHEJ), supporting a model whereby provisional deficiency of PARP1 and BRCA would lead to a shift toward NHEJ, resulting in synthetic lethality. Another proposed theory is that PARP1 and HR-related proteins settle distinct pathways for the restart of halted replication forks; therefore, PARP inhibition would be selectively toxic in HR-defective cells. (Refer to figure 1)

This exemplifies the concept of 'synthetic lethality' resulting when concurrent inhibition of two cellular pathways leads to cell death, while inhibition of either one of the two pathways alone does not.

Extending the Universal Potential Targets of PARPi

The enhancing effect of PARPi on the platinum-based drugs such as carboplatin on HRR-deficient or -proficient tumours cannot be described by the above mechanisms. The DNA damage caused by platinum compounds is mainly repaired by the nucleotide excision repair (NER) pathway and not BER, thus we have to diverge our thoughts away from BER. Indeed PARPi might be causing vasodilation to enhance intra-tumoral delivery of platinum drugs, although further preclinical and in vivo testing is required in this area.

Other targets of PARPi include:
(i) Transcriptional control of drug-target genes: PARPi have been shown to upregulate toxicity of topoisomerase II-poison doxorubicin in vitro. This effect could be linked to the decrease in expression and activity of PARP-1 triggered by doxorubicin or PARPi-induced increase in expression of topoisomerase II.
(ii) Mitotic checkpoint: the advantages of PARPi with microtubule-stabilizing mitotic inhibitor paclitaxel in patients with recurrent metastatic gastric cancers with BRCAness phenotype could be linked to suppression of the role of PARP-1 in maintaining the mitotic checkpoint via PARylation of itself or the mitotic checkpoint protein CHFR. A withdrawal of mitotic checkpoint would induce apoptosis, because cells will be forced to differentiate before damage clearance.

Almost four decades have elapsed since Durkacz and colleagues forecasted the therapeutic potential of PARPi. Despite intense research efforts, progress toward regulatory approval of PARPi is stalling. New functional settings are being explored in which PARPi could expand their therapeutic window – including tumour-promoting inflammation and angiogenesis. Let us look forward to see how further advances in this field will impact treatment resolutions.

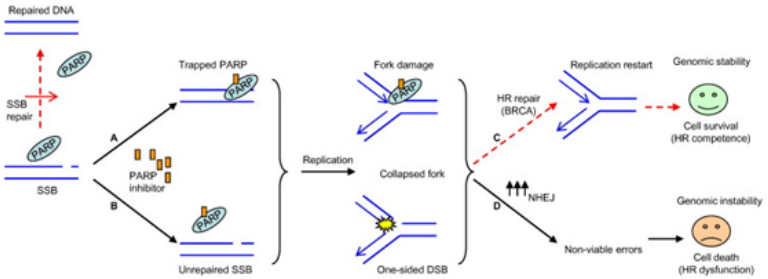

Figure 1: Molecular pathways underlying PARP/BRCA synthetic lethality. (http://www.sciencedirect.com/science/article/pii/S0304419X14000572#gr1) Red dotted lines indicate processes impaired by PARP blockade in HR-defective cells. In the presence of PARP inhibitors, SSB repair is precluded and either PARP is trapped onto DNA (A) or unrepaired SSBs are converted to DSBs by collision with the replication machinery (B). In both cases, resultant replication fork damage requires operational HR for efficient restart (C). HR-deficient BRCA mutant cells redirect to alternative, error-prone DNA repair pathways (D), undergoing genomic instability and cell death.

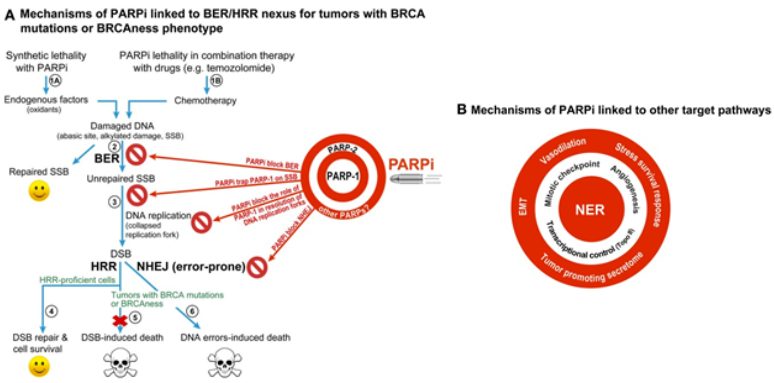

Figure 2: Different mechanisms for therapeutic efficacy of PARPi in cancers. (http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3827545/)

The Place of FGM within Innovation and Technology

Shafia Khanum

FGM stands for female genital mutilation or female circumcision which is described by WHO as 'all procedures that involve partial or total removal of the female genitalia or other injury to the female genital organs for non-medical reasons' (WHO, 2013).

Although female circumcision is a practice that dates back to Pharaonic times, it is starting to become more apparent now during gynaecological procedures and childbirth due to migration from African and Middle Eastern countries, which is also increasing. Therefore, it is very important for medical professionals to be aware of the procedure and how to deal with it hence why I would like to share my experiences.

For my Masters, I did research on 'the place of female circumcision within the Somali community of London'. Doing this research was not easy though! I think the biggest problem was my identity. I thought it would be easy for me to relate to Somali women as I was a Muslim woman, especially when I visited the mosques, however, this did not help.

The fact that I was not Somali made me an 'outsider' and so people were really cold towards me and reluctant to speak to me. For example, when I sat down next to some women at a local Mosque they shuffled away. Many organisations also told me that nobody will speak to me and put the phone down or turned me away. Others promised to reply to my emails but did not. This suggests that being Muslim is not the only part of Somali identity but culture, tradition, language and heritage also come into it which I did not know or have. The only way I was able to access informants was through personal contacts and networking from specific events. In addition, I tried to contact many men but they either did not want to speak to me or they just did not reply.

I'm not really sure why this was so. It could again be because I am a non-Somali Muslim woman so they did not feel comfortable discussing it with an 'outsider' or because they just did not have time to reply because they were too busy or could not gather the informants within my timeframe. However, I do not think that this impacted majorly on my ethnography as I still managed to obtain some interesting insights

In conclusion, my aim towards writing this article was not to say bad things about the Somali community but to show that old cultural practices still exist and how strongly people believe in them. It does not matter how much technology and innovation evolves, as long as people live, so will their identity which is partly formed by their culture.

Therefore, as future doctors it is our job to understand and respect these beliefs rather than judge them and try to force-eradicate them because it will only push such practices underground hence why developing awareness, communication, empathy and teaching methods within future health professionals may be a better way to reach out to these communities.

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Interview with a Foundation Doctor

Shayma Shamo

Keith Sacco is a First year foundation doctor, we went up to him to ask him what it's like.

Tell us about yourself.

My name is Keith Sacco I am a first year foundation doctor at Mater Dei hospital. I studied at the University of Malta. I am also a part time oboist with the Malta philharmonic orchestra.

Why the oboe?

We had music lessons at school when I was around 9 and our music teacher played "Peter and the wolf" by Prokofiev. The oboe interprets the part of the duck and I was intrigued by the sound of the oboe. I always kept wondering "What if I played the oboe?" Back in 2000, there were maybe only around three to four oboists in Malta, so it was difficult to find a music teacher. So, I started to play the clarinet. Then I met up with another music teacher who set me up with the now principle oboist of the Malta philharmonic orchestra and I never looked back.

Can you see any similarities between music and medicine?

Well, I'd say there are a lot of medical students who are into music. Unfortunately, many medical students tend to quit early on. They think that the music interferes with their studies. However, I would say it is rather reinforcing, in the sense that medicine requires a sense of leadership, decision making, confidence, and a lot of skills which you can acquire from music. Especially with the oboe.

You have to play a lot of solo parts. So, you have to lead. You are the leader of the wood wind section. You have to make sure everybody is in sync as a team, you have to focus on team work, team building, and make the right decision at the right time. If two players are not together, you have to make the decision who is going to move their parts to come together, with one goal, to perform.

This is what you have to do in medicine you have to perform on a daily basis. If you stressed, tired anxious, there is a patient's life and you have to deliver. So yes, I think music is very important for character building especially in medicine. Apart from time management and the other things people usually talk about.

Do you see yourself as a leader or a follower?

Well, when I was young, I was very timid and shy at school. I never saw myself as a leader, but after going through the first year of medical school I stood for the foundation representative position and since then I've always taken an active role in student representation and voicing other people's opinions. However, I think it's important to know when you have to lead in medicine, and also when you have to take a step back.

As a foundation doctor, you are usually seen as a follower. You usually take orders from your senior doctor and just do what is told. However when you are on call alone, you have to be the leader. Usually you're the first on call. You deal with the acute patient, you are the first on the scene and you have to really answer appropriately to your call and lead the nursing staff. So, you have to really know when to balance.

At this stage, I consider myself more of a leader in the sense where I am involved in student representation. I also have lead the wood wind section of the Malta youth orchestra. So, I've been involved in leadership positions. However, being a leader does not mean that you can't be a follower and let others demonstrate their leadership skills within your team.

How would you describe the day of a foundation doctor?

Your job as a foundation would tend to vary with your placement. However, a foundation doctor is usually required in 2 years to do; 6 months of medicine, 6 months of surgery, and 3 months of A&E. Those are compulsory.

Your work mainly starts off coming here before 8 o clock. You are assigned with a consultant generally, but in some specialties you're not, you just have to do wards. You have to print the blood test results and print the list of the patients assigned to that consultant. Then you see if there are any abnormal bloods, and you act on them. Then you go to a ward round with your seniors, and then the day varies accordingly.

In medicine, the day is focused on ward rounds and out patients' days. You are more involved in managing ward rounds. Then you tend to do what is generated from the ward rounds. Such as booking and imaging, any MRI investigations, and asking for consultations. So you need to know your rather patients well. Not by bed number, but by name by presentation and their complications.

In a surgical rotation, you will have days, for example theater days where you go down and scrub up. It depends on your seniors who let you assist in the surgery, but you generally assist in a lot of minor procedures. You can do some minor procedures on your own and also assist in major ones. It depends on certain specialties, in neurology for example you're allowed to do certain invasive procedures such as supervised lumbar punctures. So, that's a very good competency.

Those are the main jobs as a house man, your main doctor skills come out when you're on call. That is when you examine patients, take para-histories, resuscitate patients, and do your very basic immediate management plan. That's where you start to learn, because you will identify the lacunae in your knowledge and your skills, but you also have senior back up which is a very good thing.

When I asked you about your day as a foundation doctor, was there a specific day or situation which came into mind?

Main days that come to mind are either days where I make a very good diagnoses. For example, I had a patient with recurrent hyperkalemia, and the patient was vomiting and usually we give a hyperkalemia regime. His hyperkalemia regime had not worked three times, the patient was not responding to his treatment. I decided to check his morning cortisol because I thought it could be Addison's disease, and it actually was Addi-

son's. When you make a diagnosis as a foundation doctor, that's one of your memorable days.

Other days involve mainly communication skills. I remember the first day when I broke bad news in a terminal brain cancer patient. The patient passed away. The delivery was very important. I also remember a day where the patient passed away after battling HIV/AIDS, he was in a long term relationship with his male partner. I was really impressed by the support this patient gave his partner, and it was very sad seeing him go.

Those are the main days I remember. I realized the foundation program teaches you things that you don't learn in medical school. Mainly communication. Communication is a big part of clinical medicine. It's not how much you know but how you deliver it, and understand the patient's concerns and what they expect from your management.

What sort of tips would you give to medical students before going into their foundation school?

I know that medical school trains us for communication, by organising seminars and etc. I think they're all helpful. However, it all boils down to being open, learning from other people, seeing how others communicate, and trying to engage with people on a human level. It really boils down to being human. I don't think there are any courses that teach you how to be human, but you have to be humble enough to go down to the patients level, and understand that, this is a sick person that wants to get better, and his health is effecting so many dimensions of his life. After all this is the WHO definition of health is.

Can you tell us about one thing you want to work harder on?

I worked in post-surgery, and Thursdays we had a breast cancer list. The surgery is in the afternoon and patients are very anxious in the morning. I used to go around to see them in the morning. I didn't have to do it, but I wanted to go to establish some report with the patients. Unfortunately I used to be very emotional to them. I used to be annoyed and quiet distraught that I didn't manage to console them enough. I guess being there by their side makes them more at ease. Unfortunately, when patients are distressed, sometimes the best thing to do is to offer them your support without saying much.

What's an accomplishment that you've made throughout the year?

An accomplishment is the feedback you receive at the end of a placement. It is very satisfying, especially when it is from the consultant you work with. It's important to be a team player. I cannot pin point to a specific accomplishment, but really to feel that you've made a difference in a patient's life.

For example basic things; a patient is just diagnosed with colon cancer at a colonoscopy, and before the patient recovers from the anesthetic, you go, you take his tumor marker, take the basic bloods, book his staging CT scan, call the radiology department for CT scanning, and arrange the next available operation. That way you have streamlined all the investigations, making the burden less on the patient. That way the patient is more satisfied with the outcome.

So it's true some tell you, your job as a house man is a glorified clerk. When you look at it from that perspective, you are doing clerical jobs true, but you can be really effective in patient management in that way.

Why did you choose to stay in Malta for your foundation year?

In the UK you get six placements, here you get eight placements and that was a plus for me. I'd like to rotate in as much rotations as possible. Secondly, my character is such that I wanted focus more on my competencies rather than settling in a new country. I know the hospital, I know the system, that way I can focus on the medicine. Thirdly, I believe that the foundation program here is very solid, has a very good reputation amongst the other foundation schools in the UK.

You were involved in a lot of research when you were in medical school. Do you think that benefitted you in your foundation year?

Definitely. You can never do enough research. Research gives you the dimension of critical thinking, which unfortunately medical school tends to be very didactic and very information ladled. I did both basic and clinical research.

Unfortunately in foundation school there is this tendency to either be packed down with clerical work, not having the time for research. Or else the opposite, you can get locked down in a rat race of audits, going for quantity not quality. I'm not here to say against audits, but it's important that when you have research experience that you can plan out your proposals better with a solid methodology.

So, yes I think research helps. The fact that you are competent in searching for literature, when you have difficult patient which you have to refer abroad or difficulties in further management in the firm. You are an essential tool where you can direct the firm to what latest guidelines and latest evidence there is.

Any final words?

Do not think that any year in medical school is unimportant. There is the idea that the first two years in medical school are a waste of time and the last three years clinical years. That is a categorical lie. Basic science is as important as clinical knowledge. We are scientists practicing evidence based medicine. The new drugs develop on knowledge from pharmacology and pathology. So every year is important. Having a solid foundation will help you in clinical knowledge, and they are complimentary to each other. It is a process.

One professor at medical school had told us on the first day of medical school. "Your life has now changed. You will look at your life as pre medical school and post medical school." It's true. Your life as a doctor doesn't change much in your thought processes apart from your working hours, but your life changes at medical school. If you were to adopt medicine into your life, having a critical mind wherever you are throughout medicine, and enjoying the experience. Not studying for exams but enjoying medicine, because medicine is such a beautiful subject matter, so broach so vast. You'll enjoy medicine.

I think the failure these days is that, if you go into medicine with the idea that you want to specialize and build your CV and take every opportunity to build your CV. I think it won't be so fruitful. For example foundation years, are important because you learn general competencies, and knowing general competencies will serve you in the future, whatever you do.

My final words to medical students would be: Be open , take every opportunity that comes your way and be human at the end of the day, enjoy your life.

There are more things to life than medicine, but enjoy the medicine as well.

My Healing Heart's Bereavement Advice

Georgiana Farrugia

The loss of a loved one is a dreadful event that the majority of us are likely to experience at some point in life. The earlier it happens and the more significant the loss is, the greater the intensity of the bereavement process. This is likely due to the huge transformation sudden death will bring about in ourselves, the way we look at our surroundings, and our perspective towards life itself. While there is no right or wrong way to grieve, dealing effectively with its correlating pain is a central process that will permit us to move on with our own lives.

The bereavement process is a completely natural, but a highly personal response to loss. How we grieve ultimately depends on a multitude of factors, such as personality, support, coping mechanisms, faith as well as the nature of the loss itself. But one thing remains in common … healing takes time and it happens gradually. It can't be forced or hurried, and it is imperative to understand this. Some people start to feel better in weeks or months. For others, the bereavement process is measured in years. Despite repetitively hearing comments such as "Hold on, be strong!" or "Life goes on!" it is important to be patient, and to allow the process to naturally unfold. We will grief in no one's acceptable way, but our very own.

The Psychiatrist Elisabeth Kübler-Ross introduced what today is known as the five stages of grief, i.e. Denial, Anger, Bargaining, Depression and Acceptance. Contrary to popular belief, we do not have to go through all these stages in order to heal. Moreover, it is very probable that we do not experience them in that exact sequential order. Personally, I like to think of the bereavement process as a roller coaster, full of steep highs and big lows. The ride tends to be rougher in the beginning, but fortunately it tends to become less intense as time goes by.

Immediately after a loss, it can be hard to accept what really happened and it is highly likely (usual) to deny the truth. Whilst our body is in a state of shock, we may feel numb, but we may keep expecting our loved ones to show up even though we are fully aware they are gone. We may also regret some things we did, or perhaps feel angry about a bunch of loving words (loving phrases) that we did not have the opportunity to express to the deceased. Others may feel guilty about the inability to do anything to prevent the death of a close relative or a friend. Profound sadness is the most universally experienced symptom of grief. It may be accompanied with feelings of emptiness, despair, yearning or loneliness. Many of us may cry, or continuously feel anxious or insecure as the death of a loved one can trigger fears about our own mortality or the responsibilities we will now be facing alone. In addition to periods of emotional instability, the bereavement process often involves physical symptoms such as headaches, fatigue, nausea, lowered immunity, weight loss or gain, insomnia, intestinal disturbances or chest tightness.

The number one step of coping effectively with grief is to accept support, wherever it comes from. Now is the ideal time to turn to our close friends and family members, or join a bereavement support group where we may share our sorrow with people who have experienced similar circumstances in life. It is vital that we do not try to ignore our pain, but seek to address it actively. Keeping it from resurfacing will only make it worse. Moreover, it is vital to recognise that if we find ourselves crying in the middle of our daily routine, it does not mean we are weak, but it is often a sign that we are thinking dearly of our loved ones. Thus, we have to embrace these moments by letting go of the desire to put on a brave front.

Furthermore, it is ideal to prepare ourselves psychologically for 'grief-triggers', such as family weddings and holidays, or other important milestones, such as graduation ceremonies or the birth of a child, can reawaken grief memories and mixed feelings. It could also be helpful to vent our grief through expressing our feelings in a tangible and creative manner. We could seek to write about our loss in a journal or be conservatively open (not quite sure what this means…) about it on social media, create a photo album or another form of artwork depicting the deceased person's life, or get involved in sports or perhaps voluntary work organizations. Whatever our personal interests are, now is the time to fill our lives with activities we like doing. Another vital step throughout this difficult period in our life is to look after our psychological and physical health. It is very probable that one might experience concentration difficulties, most likely because we will automatically find ourselves focusing attention on how our relative, or friend, has died or how our life together was close to perfect before they died. Stress and fatigue can be combated by getting enough sleep, eating well and exercising regularly. Moreover, counseling therapists and family physicians are always available to lend us a helping hand – especially if we recognise symptoms of complicated grief or clinical depression from a normal bereavement process.

It is completely accepted for grieving people to prefer spending time alone. Sometimes we are drawn to the quietness and safety we experience in our own bubble of thoughts, or else it may simply be a way of dodging other individuals for various reasons. Even venturing out to the local grocery store or shopping mall can make us feel uncomfortable. Often times, we find ourselves resenting how much we take everything for granted or may feel jealous for our peers that are not going through such excruciatingly painful moments. Fortunately, these feelings are usually temporary.

Acceptance is the final, glorious step of the bereavement process. Ultimately, we will be able to accept that loss is a basic part of our life cycle. Whatever grows must decay. Whoever is born must die. It is only whenever these universal facts are fully understood and accepted, that we will find ourselves seeking alternative sources of security and happiness. Always bear in mind that we will pull through, because we are all greater than the hardship life chooses to throw at us. Until then, I wish you all the best in plucking up the strength and courage to create a better tomorrow.

Innovation : Fresh Thinking that Creates Value

Natalie Galea

Easton LaChapelle made his first robotic hand at the age of 14. Lacking the correct kit he made it out of fishing wire, Lego and scavenged electronic parts- all in his bedroom. Now, at 19 he's founded his own company, worked for NASA and is already changing the prosthetics industry for the better.

It was a chance encounter with a young girl that compelled Easton down the road he's on. In 2011 while presenting his robohand at the Colorado state science fair he met a 7 year old girl who had a prosthetic arm. Her arm had cost $80,000, had limited movement and would need replacing when she outgrew it. According the prosthetics outreach foundation children outgrow their prosthetics in around 6-12 months. For adults replacements are generally needed around every 3-5 years. This means that young people may require up to 25 limbs throughout the course of their life. With the cost of an upper extremity prosthetic ranging from $3000-30,000 costs can quickly mount up.

This meeting inspired Easton into creating a high tech prosthetic that was highly functional at an affordable price. He wanted to make prosthetics more accessible- and he's done it! He has now completed a prototype arm which costs around $350 to produce-a fraction of the cost of the average prosthetic. Not only that, it has higher functionality than traditional offerings.

So, how has he driven the price down?
The answer: 3D printing. In his prototype nearly all the components are created using a 3D printer. With his company, Unlimited tomorrow, he's even made the robotic arm and hand open source so it can easily be reached by anyone who needs it.

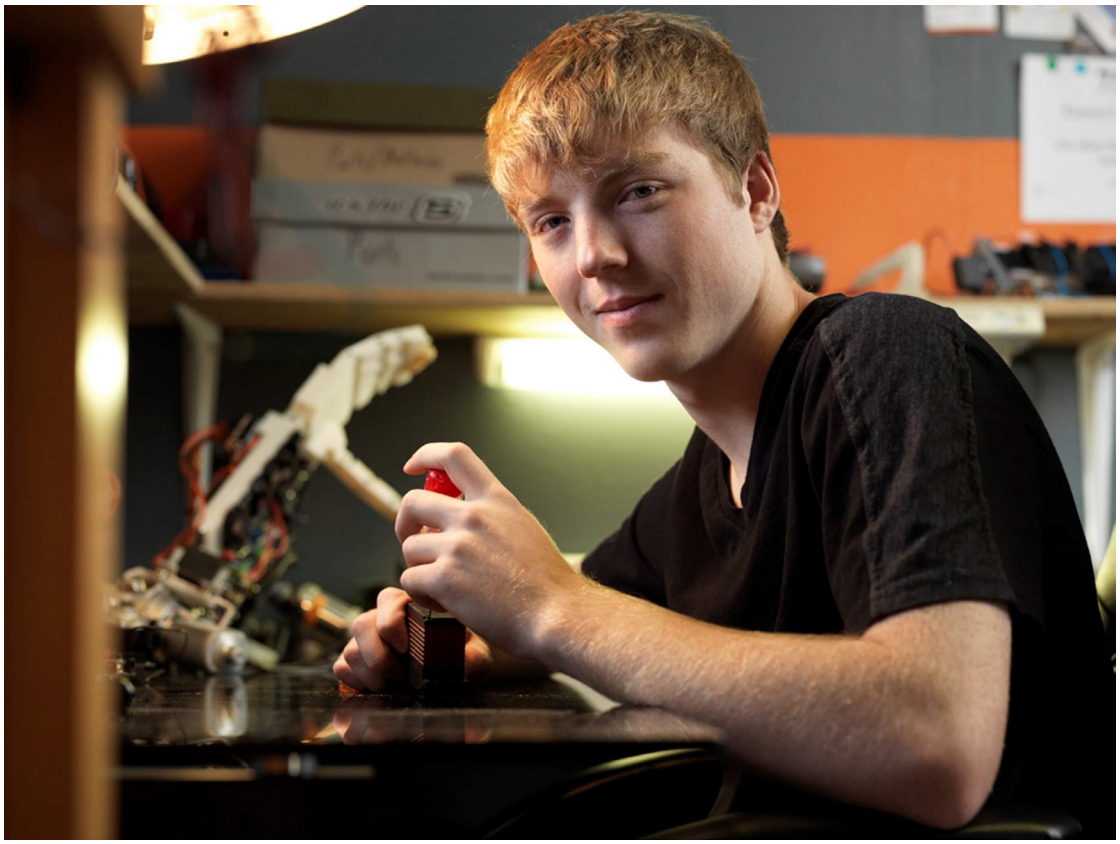
The arm makes use of Bluetooth technology and an Electroencephalography (EEG) headset to control movement. As well as being an attractive price Easton's design is also non-invasive and can easily be taken on and off. This is more desirable than undertaking the risky surgery needed for some of the more advanced implant driven prosthetics available.

The low cost of the robotic arm will mean that it could come in handy in other industries- Heineken have even asked for 5,000 to be produced to serve beer in their bars! Education is another sector that will see benefits. The open source nature of the roboarm provides a perfect platform for the teaching and development of robotics.

Easton believes that sharing his technology will lead to faster improvements. He says that "No one person can change the world…other people can take what I've done and grow from it and do something more with it, someone could take that and keep impacting someone else's life and eventually try and rule out a lot of the bad in the world by giving back to our own kind."

Currently the goal of his company is to develop a new concept of an exoskeleton to help paraplegics walk again- a goal motivated by the desire to help a friend regain independence and the ability to walk.

He's definitely an inspiring teen.



Common Health Issues

Like anywhere else in the world, Malta has its problems to face. One's genetic background and environmental conditions may make one susceptible to a certain disease whereas someone of living in another country or of another ethnicity may be unaffected.

The healthcare system in Malta is considered one of the best in world, despite its flaws. The Maltese have a life expectancy of around 80 years, which has increased over recent years.

The fact that we are living longer allows disease to plague the body and since advancements in medicine have permitted one to live with these illnesses in the form of chronic conditions, the statistic reveal that these diseases are becoming more prevalent.

You may have heard someone argue that cancer is becoming more and more common nowadays. Apart from multiple factors, such as smoking, inhalation of pollutants and exposure to carcinogenic chemicals, it is also important to remember that we are now living longer and can expect a higher chance of developing cancer. In the past people would frequently die of an infection that is now easily curable.

Non-communicable diseases are Malta's biggest health issue. Ischaemic heart disease (IHD) is the prime killer in Malta, causing 22% of all deaths in recent years. Maltese men and women over 30 have a higher risk of dying from heart disease than other European countries, although these rates are decreasing. Bronchial asthma is a particular health concern in Malta – its high prevalence is partly explained by the hot and humid climate, our genetic disposition towards it and relatively high smoking rates. There is also the problem of asthma patients not adhering to medication, which leads to failure in asthma control, sometimes leading to asthma attacks (sometimes fatal). An observation recently made is that in the past, children and adolescents would suffer from asthma and which often recedes on entry into adulthood. However, there now seems to be a trend in which former asthma patients (and even people who've never had asthma) start suffering from it later on in life. All these have placed pressure on the health clinics around Malta with many requiring treatment via nebulizer.

Another common health problem in Malta is obesity. The rate of obesity in Malta is one of the highest both in Europe and around the world. The same applies for the rate of childhood obesity.

Our rampant obesity has led to an increase in other health issues. In February 2015, an article revealed that a third of toddlers and children are at risk of tooth decay, due to their very sugary diet, and have urged parents to change their diets.

Relating to obesity, there is one problem that is all over the news; diabetes mellitus. The current statistic is 10% of the Maltese and Gozitan population. However this figure was found in a study conducted in 1981, so it is in desperate need of updating. Medical professionals suspect that this number has increased since then, given our newly acquired sedimentary lifestyle and deviance from the traditional Mediterranean diet. Though there are no evidence based statistics yet, hence the need for a study for its prevalence in our country, such as the one being conducted by Dr. Sarah Cuschieri.

Malta's commonest cancers are malignant neoplasm of trachea, bronchus & lung, followed by malignant neoplasm of colon, rectum & anus in both sexes. In females, one of the commonest cancers is malignant neoplasm of breast and in males, neoplasm of the prostate, though this is rarely the cause of death. All the malignancies mentioned above are international problems rather than local only.

The death rates for pancreatic, cervical and ovarian cancer have increased in Malta, and the current rates remain higher than other Western European countries. Death rates for breast and uterine cancers are likewise above average.

Regarding genetic problems, Malta, like many other Mediterranean countries, has its fair share of thalassemia, particularly beta-thalessemia, a haemolytic disease that arises due to a deficiency of G6PD enzyme, which is triggered by a number of foods and medication, particularly fava beans. Whereas this might not be such a problem abroad, sufferers must watch what they eat, Malta being known for its culinary use of fava beans.

Regarding infectious diseases, Malta's health system has decreased the incidence of these illnesses drastically. However, according to the World Health Report in 2006, Malta is also known to be hyper-endemic for meningococcal diseases. Despite their prevalence, they are not often lethal, provided that proper medical attention is given at the correct time.

David Borg

Hypertension

Another significant health issue locally is hypertension. About one fifth if the Maltese population suffers from high blood pressure, and its associated complications with cardiovascular disease are the main cause of death in the Maltese Islands.

Blood pressure is a key element of the way the body functions. Blood carries nutrients, oxygen and carbon dioxide around your body and is pumped by the heart. The blood is under pressure as a result of the pumping action of the heart and the size and flexibility of arteries, which carry oxygenated blood.
If arterial walls lose their elasticity, become narrow or contract too much, high blood pressure can result. One's blood pressure can also rise if his/her heart pumps too much blood or has too much blood in your circulation.

There are two forms of hypertension. Primary Hypertension is easily the most common form (95% of all cases) which results from a variety of factors related to lifestyle. In Secondary Hypertension in which case there is an underlying cause such as kidney or endocrine disease. Primary Hypertension is known as a "silent killer" because it does not usually show any symptoms, so a diagnosis can only be made by having one's blood pressure checked.

Despite not easily cured, the right lifestyle changes can make a difference in treatment of hypertension. These include stopping smoking, changing of diet to one of low-fat, low-salt intake, consuming fruit and vegetables and cutting down on alcohol, coffee and high-caffeine drinks. These ought to be combined with doing regular exercise and losing any excess weight.

If these are not enough and blood pressure remains high, a GP may prescribe medicines to try and lower it. The most commonly prescribed antihypertensive medicines include:

• ACE inhibitors (e.g. ramipril) or angiotensin-II receptor antagonists (e.g. candesartan) – these dilate the walls of your blood vessels by reducing the production of hormones that cause your blood vessels to constrict (narrow).
• Calcium-channel blockers (e.g. amlodipine) – these dilate vessels by relaxing the muscles in your blood vessel walls.
• Diuretics (e.g. indapamide) – these increase the amount of water and salt removed from your blood by your kidneys, lowering the volume of your blood, which reduces blood pressure.

The medicines GPs actually prescribe depend on a number of factors, including age and ethnicity. The best treatment aims to balance out the efficacy of treatment and benefits against any possible side effects. It is highly recommended that medicines are taken every day until one's blood pressure improves, unless directed otherwise by a GP.

Diabetes Mellitus

Diabetes is one of the major health issues in Malta, and currently about 10% of the Maltese population has Type 1 or Type 2 Diabetes Mellitus. This is relatively high when compared to our neighbours in Europe (2-3%). Worryingly, 1 of every 4 premature deaths (before the age of 65) is due to diabetes mellitus. Historically, following World War II, diabetes in the Maltese population reached an epidemiological peak, probably due to the economical effects of the war. One theory suggests that a restricted diet in pregnancy, amongst other factors, made the Maltese people vulnerable to diabetes.

There are three main types of diabetes: Type 1, Type 2, and gestational diabetes.

Type 1 or juvenile diabetes develops when the body's immune system destroys pancreatic beta cells. These are the only cells in the body that make insulin. This form of diabetes usually affects children and young adults. Locally, only 1% of the Maltese population suffers from Type 1 diabetes. Risk factors for Type 1 diabetes may be autoimmune, genetic, or environmental. Up till now, there is no known way to prevent Type 1 diabetes.

Type 2 or adult - onset diabetes occurs when the body does not produce enough insulin or the cells do not use insulin properly. Type 2 diabetes is the most common form of diabetes and strikes 9% of the Maltese population. It is associated with older age, obesity, family history, physical inactivity, and race/ethnicity.

Gestational diabetes is a form of glucose intolerance diagnosed during pregnancy. It affects about 6% of Maltese pregnant women. A diagnosis of gestational diabetes however doesn't mean that a woman had diabetes before she conceived, or that she will have diabetes after giving birth.

Possible symptoms of Diabetes Mellitus include excessive thirst, unexplained weight loss, numbness in hands or feet, tiredness and dry skin.

Medical Technology : Solving

"I still use a stethoscope. It's not a collector's item yet, but I don't think it will be much longer."

-Anon

Innovation and sheer determination has been the main driving force behind the technological industry. Throughout the past few years major enhancements and improvements have been made within the smallest timespan possible.

Since the first wooden stethoscope was created around 200 years ago, hundreds of diagnostic tools have been invented - from the flexible endoscope to CT and PET scans - many of which form an integral and essential part of our investigational procedures.

A few other breath-taking discoveries are mentioned below;

- Coronary bypass surgery executed robotically by a surgeon situated in New York City, with the patient being operated in Abu Dhabi.

- Adjustment of organ functions in order to treat disease or preserve health involving the patient having to place his palm on a glass in order for an electronic signal to be transmitted to the internal organ required.

- Promising research concerning satellite delivery of an experimental form of radiation to the developing world that will decimate food borne illness.

It is quite improbable to touch upon all the aspects of medical technology due shear vast divisions of the industry revolving around medical technology. In this article I will be closing in on a recent idea that will have an aggressive impact on the future of medical research.

Another common health problem in Malta is obesity. The rate of obesity in Malta is one of the highest both in Europe and around the world. The same applies for the rate of childhood obesity.

With all the advancements made in creating faster instruments to analyse data and samples and speed up lab work, research still faces a number of challenges. 4 major challenges for the current majority of research projects are commonly noticed:

1. **Limited participation -** resulting in small sample size and this limits the understanding of diseases. One study sent 60,000 letters to potential participants - out of which only 360 replied and showed interest in participating!

2. **Infrequent data** - getting only 'snapshots' of data in a particular timeframe rather than throughout the entire year

3. **Subjective Data**; when it comes to assessing the severity of a disease's characteristic - most are assessed on a scale based on an interviewer's experience (especially where a defined set of criteria is unavailable). This can be seen in Parkinson's, where the gait is assessed subjectively when the patient is walking in front of the interviewer. This is rated on a scale of 0 to 4 based on the interviewer's experience.

4. **Communication flow**; participants often don't hear back until the very end of the study, if at all.

However, Apple has shown the world earlier this year that it holds the key to these limitation. The answer lies in the Research kit.

Throughout the years smartphones have started to become diagnostic tools. Impressive feets and examples -

• By placing the phone on your chest, cardiopulmonary data can be forwarded to your cardiologist who would then transmit your necessary medical adjustments electronically to you.

• Smart phone analysis of a saliva sample will allow you to screen for risk factors for 20 common chronic diseases that will have effective preventive strategies.

Furthermore, recent medical gadgets, such as glucose meters, can be wirelessly linked to your smartphone and readings and data can be transmitted directly to your phone.

The developed and established concept of using your smartphone as a diagnostic tool was taken a step further by the billion-dollar technological company, Apple. Together with a distinctive and renowned number of major universities and institutions, they have turned the iPhone from a diagnostic instrument to a powerful research tool. IPhone users will be able to use their iPhone to participate through a number of apps found in the software framework research kit in any available research of their choice.

the Lethargic Research Time Period

Leonard Callus & Matthew Zammit

Taking as an example the Parkinson's disease app, one can participate in a global research project concerning the disease. This allows the iPhone to be used as a diagnostic tool, where the participants are asked to carry out the following tasks;

• Hand tremor test: use 2 fingers to alternately tap as fast as you can in 20 seconds.

• Vocal Chord variations - simply say "Ahhhhh" into your iPhone speakers

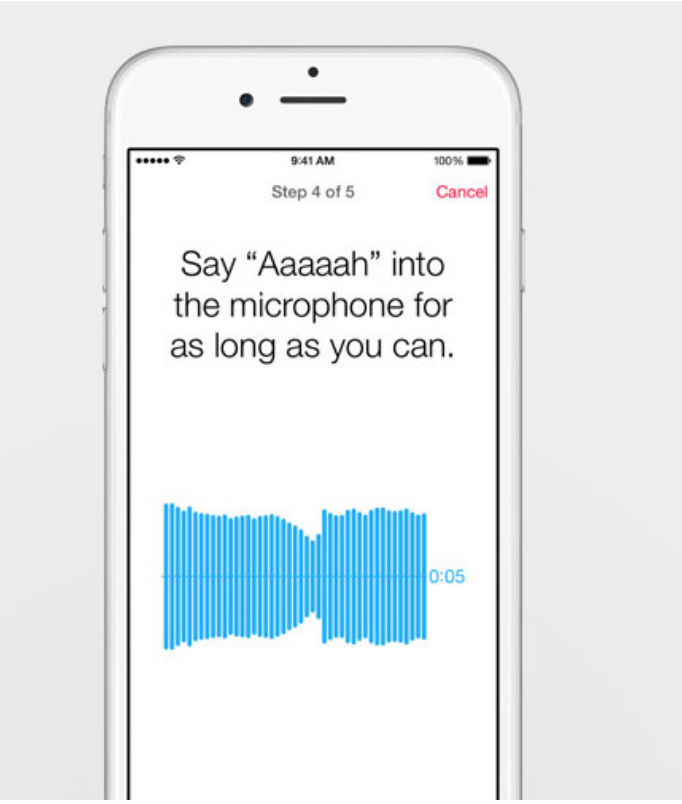
• Gait and Balance Test: put your iPhone in your pocket - walk 20 steps and back and the iPhone's accelerometer & gyroscope precisely measures the gait

The best part is that whilst researchers are obtaining data for their research projects, the participants are also given access to their personal results obtained from the tests. This empowers users to understand more of the current on goings of the research project.

There are further apps for Asthma, cardiovascular disease, diabetes & breast cancer. However as it is "open source" researchers can further develop apps and after being closely reviewed by Apple, these can be used by iPhone users via research kit.

Taking the concept of the Asthma app as an example of the heights reached by the research kit:

A research group from the school of Medicine at Mount Sinai is currently carrying out a study in New York City regarding specific pathogenic involvement in the pathogenesis of Asthma. To increase data accuracy, the research team primarily distributing freely spirometers and Bluetooth inhalers to asthmatic participants, and are currently swabbing city surfaces throughout New York City to look for pathogens.

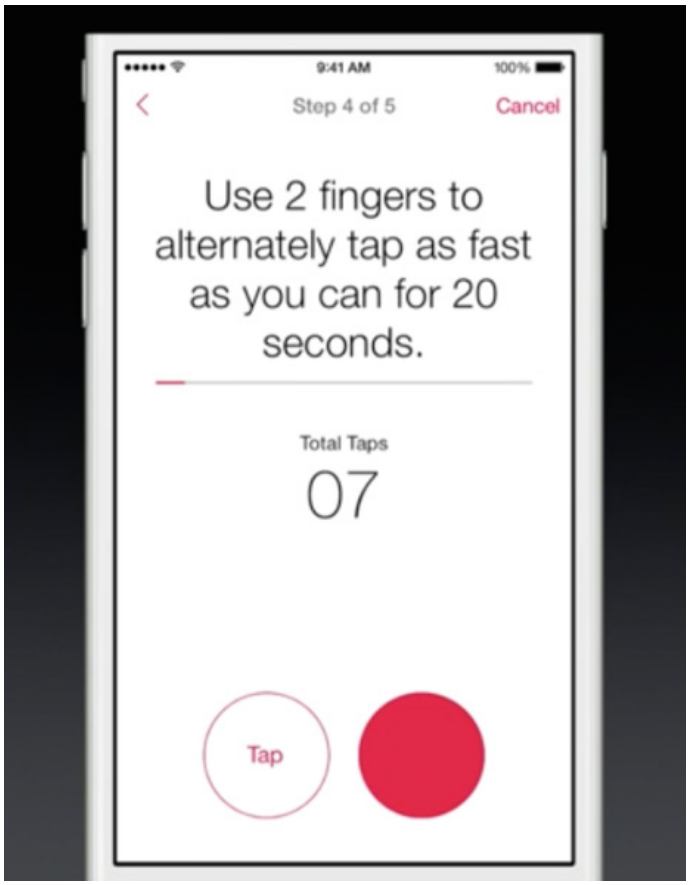


Through use of the participant's iPhones' GPS coordinates, the research group may compare exacerbations from spirometer data to the pathogens collected at the specified site in New York City. By tying all the data together, this may bring the healthcare community even closer to confirming what and what does not trigger asthma.

However, I should also make it clear that it is entirely the choice of the individual person to choose which study they wish to participate in (if any) and what data they wish to share. A waver of confidentiality must be signed prior to participating in the research. Lastly, Apple has expressed that it will NOT be seeing anyone's data.

Whilst this article may get across at first as a promotional advert, its sole purpose and intention is to highlight this current breakthrough, which may be of tremendous benefit to our future research projects. The solutions are literally in our hands, at the touch of the button. Whilst it's still in its early stages it will definitely leave its impact on global medical research, on every condition out there.

The research kit is definitely a game changer for the research industry. It is the stepping-stone to the future of medical research… this is where research is heading!



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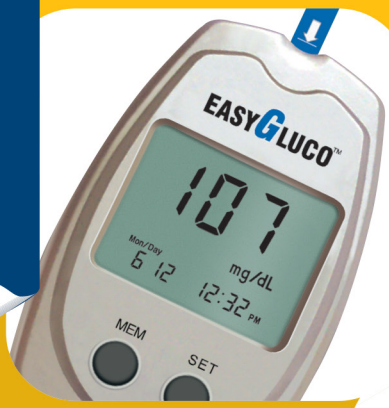
Automated External Defribillator

Sleep Apnoea Solutions



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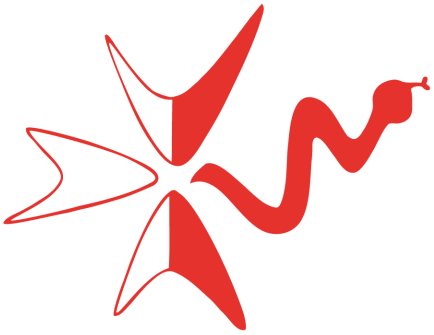

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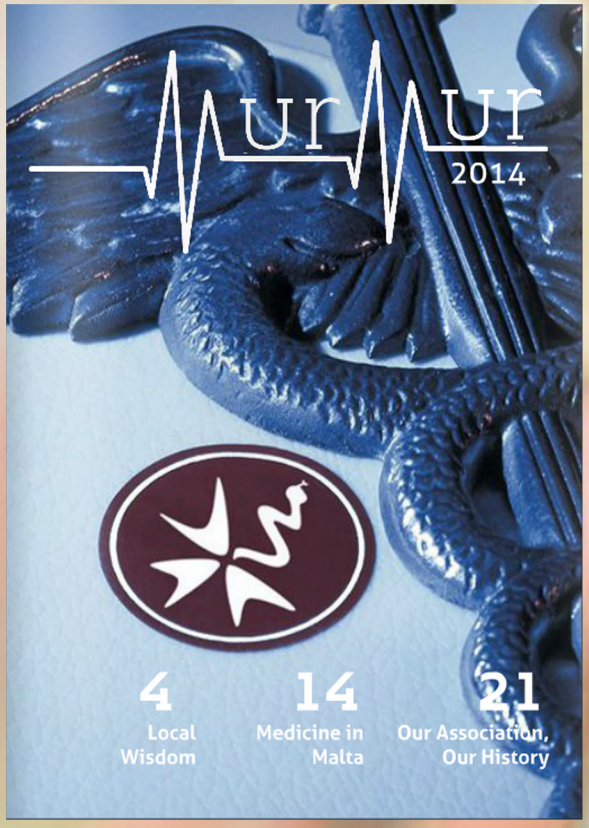

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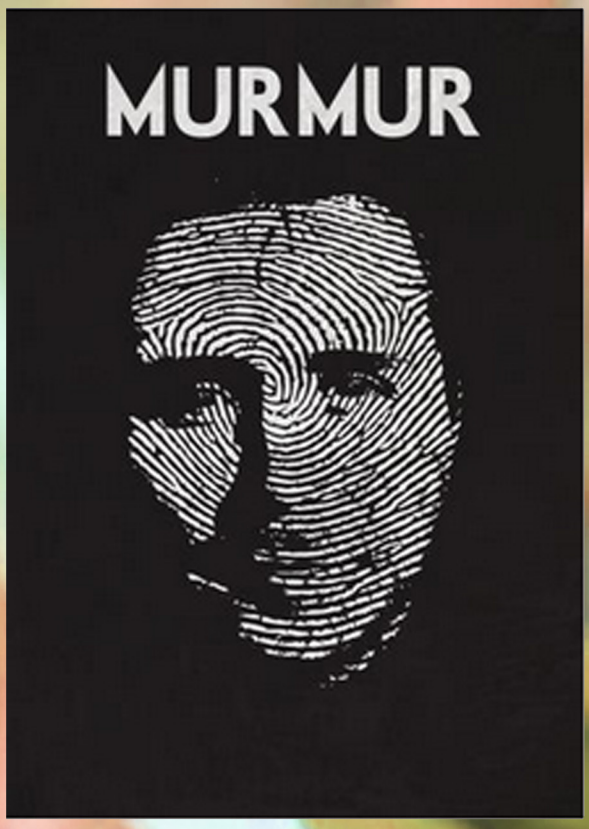

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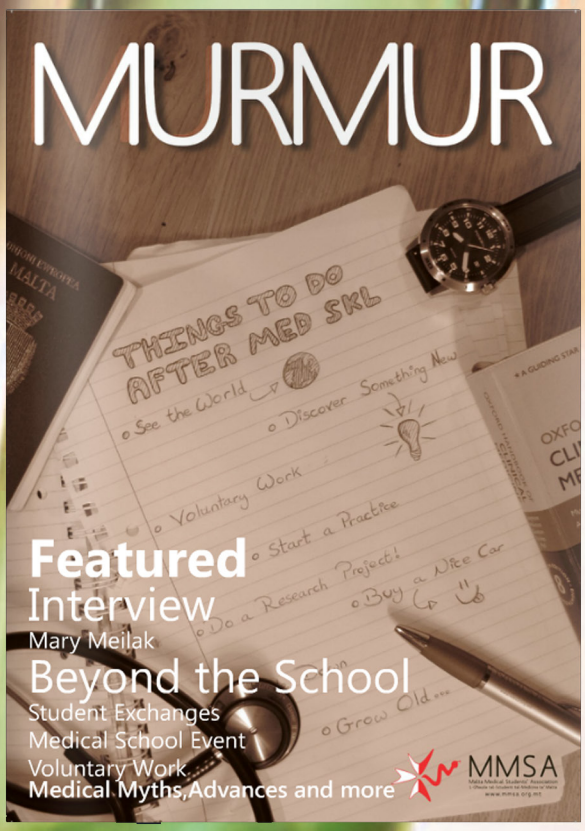

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